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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re application of: Scott D. BLANCHARD et al. Group Art Unit: 2131

Serial No.: 09/447,312 Examiner: M.R. Vaughn

Filed: 11/22/1999 Confirmation No.: 3661

Attorney Docket No.: IRI03844

For: PACKET ORDER DETERMINING METHOD AND APPARATUS

APPEAL BRIEF PURSUANT TO 37 C.F.R. § 1.192

Mail Stop Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This is an Appeal Brief under 37 C.F.R. § 1.192 appealing the final rejection of the Examiner dated November 20, 2003. The Brief is provided herein in triplicate, and each of the topics required by 37 C.F.R. § 1.192 is presented in this Brief and is labeled appropriately.

I. Real Party in Interest

Motorola, Inc. ("Motorola") is the real party in interest of the present application. An assignment of all rights in the present application to Motorola was executed by the inventors and recorded by the U.S. Patent and Trademark Office at **Reel 010405, Frame 0490**.

II. Related Appeals and Interferences

There are no appeals or interferences related to the present application of which Appellant is aware.

III. Status of Claims

Claims 1-27, which are presented in the Appendix, are pending in the application. Claims 1-27 stand finally rejected. Accordingly, the Appellant hereby appeals the final rejection of Claims 1-27.

IV. Status of Amendments

Following a first Office Action dated August 25, 2003, Appellant filed a response pursuant to 37 C.F.R. 1.111 on November 24, 2003. Subsequent to the response, a final Office Action, dated February 10, 2004, was issued, rejecting all of the pending claims. A Notice of Appeal was timely filed March 12, 2004.

In the final Office action, Claims 1-6 were rejected under 35 U.S.C. § 112, second paragraph, due to a minor informality in independent Claim 1. An After Final Amendment is filed contemporaneously herewith to correct this minor informality, and its entry by the Examiner is presumed as it places the claims in better form for appeal. Thus, the claims presented in the Appendix reflect entry of this Amendment, and the rejection under § 112, second paragraph is not further addressed in this Appeal Brief.

V. Summary of the Invention

The claimed invention relates to a system and method for determining the relative transmission order of packets in a packet switched network. Prior to transmission, error detection codes, or forward error correction codes, are applied to packets, and are then masked with "ordering masks." The ordering masks are applied to packets in an order that is known to both the transmitter and receiver. The receiver unmasks received packets and performs error

detection. The proper relative transmission order of the packet is found when the correct ordering mask is used, resulting an acceptable error rate (page 4, ll. 15-23).

A preferred embodiment of a packet switched communications system 100 of the present invention includes first and second communications devices 101 and 111, respectively, that communicate over a communication channel 130 (FIG. 1; pg. 4, ll. 24-30). The first communications device 101 includes a voice processing block 104, a transmit processing block 110, a data formatting block 114, and a packet transmitter 120. The voice processing block 104 receives voice signals on a node 102, processes the voice signals, produces packets representing the voice signals, and sends the packets to the transmit processing block 110. The data formatting block 114 receives data on a node 112, appropriately formats it, and sends the formatted data to prior to the transmit processing block 110 (FIG. 1; pg. 4, l. 31 through pg. 5, l. 7).

The transmit processing block 110 applies ordering masks to the received voice and data packets such that the transmitted order of the packets can be discerned at the receiver, even when the packets are received out of order at the receiver. The transmit processing block 110 then sends the packets to the packet transmitter 120, which performs additional processing, such as interleaving and modulation, and then transmits blocks of data into the communication channel 130 (FIG. 1; pg. 5, ll. 17-26).

More specifically, and in a particular preferred embodiment, the transmit processing block 110 (400 in FIG. 4) includes an encryptor 406, a forward error device 416, a masking device 420, a mask store 424, and a controller 412. The controller 412 is coupled to the encryptor 406, the forward error device 416, the masking device 420, and the mask store 424, and operates to maintain proper timing between these various devices (FIG. 4; pg. 8, ll. 10-12; pg. 9, ll. 23-28).

The encryptor 406 receives and encrypts the voice and data packets and sends the encrypted packets to the forward error device 416. The forward error device 416 performs operations such as applying error detection codes, applying

error correction codes, and performing compression. In some embodiments, the forward error device 416 applies error codes as a function of the data source (FIG. 4; pg. 8, ll. 13-40).

In some embodiments, the encryptor 406 is omitted, and packets are received by the forward error device 416 from a packet formatter such as the voice processing block 104 or data formatting block 114. In such embodiments, packets undergo the application of error detection codes or forward error correction codes, and then undergo masking prior to transmission (pg. 9, ll. 24-28).

In either of the above-described embodiments, once the packets have error codes applied, the packets are sent to the masking device 420. The masking device 420 applies ordering masks, which are received from the mask store 424, to the packets to produce masked packets. The ordering masks are applied to packets using an operation that can be performed in reverse at a receiver. The mask store 424 includes a list of ordering masks in a known order. Each ordering mask is unique, and each ordering mask is applied to one packet at a time, and in order (FIG. 4; pg. 9, ll. 5-18).

The second communications device 111 includes a packet receiver 138, a receive processing block 142, a voice processing block 146, and a data formatting block 152. The blocks in the second communications device 111 generally perform the reverse of the corresponding blocks in communications device 101 (FIG. 1; pg. 6, ll. 5-16). More specifically, the receive processing block 142 receives encrypted packets from the packet receiver 138 and determines whether the received packets are out-of-order. In some embodiments, out-of-order packets are discarded, and in other embodiments, out-of-order packets are buffered and the correct order is restored. In a particular preferred embodiment, the receive processing block 142 (500 in FIG. 5) includes an unmasking device 504, a mask store 506, an error detection device and buffer 514, a decryptor 520, and a controller 516 (FIG. 5, pg. 10, ll. 3-15).

The unmasking device 504 receives masked packets, and applies ordering masks from the mask store 506 to the masked packets. When a received packet is in the correct order, the ordering mask received from the mask store 506 correctly unmasks the received packet. The unmasking device 504 sends the unmasked packet to error detection device and buffer 514. The error detection device and buffer 514 performs the reverse of the forward error device 416. When the correct ordering mask has been used, as is the case in this example, no errors are found (FIG. 5; pg. 10, ll. 16-26).

When a received packet is out-of-order, the first ordering mask received from mask store 506 will not correctly unmask the received packet. As a result, the error detection device and buffer 514 will detect errors. When errors are detected by the error detection device and buffer 514, different ordering masks from the mask store 506 are sent to the unmasking device 504. Different ordering masks are used to unmask the received packets until the error detection device and buffer 514 reports an acceptable amount of errors. Because the order of ordering masks in mask store 506 is known to correspond to the transmitted order of packets, the correct transmitted order of received packets can be discerned at the receiver, even when received out of order (FIG. 5; pg. 10, l. 27 to pg. 11, l. 5).

In one embodiment, the error detection device and buffer 514 buffers packets that are received out of order. In another embodiment, the error detection device and buffer 514 discards out-of-order packets that are older than packets previously received (pg. 11, ll 6-27).

The controller 516 communicates with the other devices and, in a preferred embodiment, keeps track of the correct order of ordering masks in the mask store 506. The controller 516 also receives error information from the error detection device and buffer 514. In this manner, the controller 516 can step through the mask store 506 and cause the unmasking device 504 to apply ordering masks until an acceptable amount of errors are reported by the error detection device and buffer 514 (FIG. 5; pg. 11, l. 28 to pg. 12, l. 8).

The first and second communications devices 101 and 111, respectively, implement various methods of adding packet ordering information, determining a packet order of received packets, and determining the transmitted order of a received packet relative to other received packets. For example, the method of adding packet ordering information to a plurality of data packets includes applying error detection codes to each of the plurality of data packets. Each of the plurality of data packets to which the error detection codes have been applied are then masked using a plurality of ordering masks in a known order (FIG. 9; pg. 14, ll. 20-29).

The method of determining a packet order of a received packet includes applying at least one ordering mask to the received packet in a known order from a list of ordering masks to find a current ordering mask that was previously used to mask the received packet. When at least one older ordering mask exists in the list of ordering masks, it is removed from the list of ordering masks (FIG. 12; pg. 16, ll. 20-27).

The method of determining the transmitted order of a received packet relative to other received packets includes setting a temporary ordering mask equal to a next ordering mask in a list of ordering masks. The temporary ordering mask is applied to the received packet to produce an unmasked received packet, which is checked for errors. The previous actions are then repeated until no errors are found, and a current ordering mask is set equal to the temporary ordering mask (FIGS. 10, 11; pg. 14, l. 30 to pg. 16, l. 19).

VI. Issues

The issues presented in this appeal are as follows:

1. Whether Claims 16-18 are anticipated under 35 U.S.C. § 102(a) by EP 762705 A2 (Takamoto et al.).

2. Whether Claims 11, 12, and 14 are anticipated under 35 U.S.C. § 102(a) by U.S. Patent No. 4,754,482 (Weiss).

3. Whether Claims 1-6, 19-24, 26, and 27 are unpatentable under 35 U.S.C. § 103 over Takamoto et al. and Weiss.

4. Whether Claims 7-10, and 13 are unpatentable under 35 U.S.C. § 103 over Weiss in view of U.S. Patent No. 5,761,431 (Gross et al.).

5. Whether Claim 15 is unpatentable under 35 U.S.C. § 103 over Weiss in view of WO 9,949,695 A1 (Larsson et al.).

6. Whether Claim 25 is unpatentable under 35 U.S.C. § 103 over Takamoto et al. and Weiss in view of U.S. Patent No. 5,528,693 (Leopold).

VII. Grouping of Claims

For purposes of the issues presented by this appeal, Claims 1-6 stand or fall together as a group, Claims 7-10 stand or fall together as a group, Claims 11-15 stand or fall together as a group, Claims 16-22 stand or fall together as a group, and Claims 23-27 stand or fall together as a group. Arguments in support of the separate patentability of each of the groups are presented herein.

VIII. Arguments

I. CLAIMS 16-18 ARE NOT ARE NOT ANTICIPATED BY TAKAMOTO ET AL.

In the final Office action dated February 10, 2004, 16-18, 23, and 24 were rejected under 35 U.S.C. § 102(a) as allegedly being anticipated by Takamoto et al. As will be explained in more detail herein below, this rejection is not tenable because at least one element recited in independent Claim 16 is not found in Takamoto et al.

A. Takamoto et al.

Takamoto et al. relates to a system and method for transmitting data over a network and discloses dividing transmitted data into packets, and furnishing

each of the divided data packets with tags. The furnished tags include a destination ID, a flag indicating division of data, a packet ID, a division count, a division ID, and a transmission time. Takamoto et al. additionally discloses detecting whether errors have occurred in the transmitted data. However, the error detection that is disclosed in Takamoto et al. occurs after the data packets are tagged.

Takamoto et al. also discloses receiving tagged data packets. Similar to the transmitted data packets, and as disclosed in FIGS. 20 and 26, and the associated descriptive text, it is the tagged data packets that are checked for errors. It is only after all the tagged data packets are received error free that the tags are removed from the data packets.

B. Analysis

Independent Claim 16 relates to a communications device that includes a packet receiver, a mask store, and an unmasking device coupled to the packet receiver and mask store and configured to unmask received packets, and recites, *inter alia*, the error detection device being configured to detect errors in unmasked received packets.

It is well settled that in order to anticipate a claim, a citation must expressly or inherently describe all of the elements of the claimed subject matter. In re Robertson, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950 (Fed. Cir. 1999); Constant v. Advanced Micro-Devices, Inc., 848 F.2d 1560, 1571, 7 USPQ2d 1057, 1064 (Fed. Cir. 1988). The citation must describe and enable the claimed invention, including all claim limitations, with sufficient clarity and detail to establish that the subject matter already existed in the prior art and that its existence was recognized by persons of ordinary skill in the field of the invention. Crown Operations International, Ltd. v. Solutia Inc., 289 F.3d 1367, 1375, 62 USPQ2d 1917, 1921 (Fed. Cir. 2002); In re Spada, 911 F.2d 705, 708, 15 USPQ2d 1655, 1657 (Fed. Cir. 1990) ("the reference must describe the applicant's claimed invention sufficiently to have placed a person of ordinary skill

in the field of the invention in possession of it"). Thus, an allegedly anticipating citation "must disclose every element of the challenged claim and enable one skilled in the art to make the anticipating subject matter." PPG Industries, Inc. v. Guardian Industries Corp., 75 F.3d 1558, 1566, 37 USPQ2d 1618, 1624 (Fed. Cir. 1996).

With regard to inherency, when a reference is silent about an asserted claim element, there must be sufficient evidence that makes clear that the missing element is necessarily present in the reference, and that it would be so recognized by the skilled artisan. Continental Can Co. v. Monsanto Co., 948 F.2d 1264, 1268, 20 USPQ2d 1746, 1749 (Fed. Cir. 1991). Moreover, inherency "may not be established by probabilities or possibilities. The mere fact that a certain thing *may* result from a given set of circumstances is not sufficient." In re Oelrich, 666 F.2d 578, 581, 212 USPQ 323, 326 (CCPA 1981).

It is clear from the above description that Takamoto et al. fails to disclose, either explicitly or inherently, at least the above-noted feature of independent Claim 16. Namely, Takamoto et al. fails to disclose at least an error detection device configured to detect errors in unmasked received packets. Indeed, the Examiner readily admits that the errors that are checked for in Takamoto et al. are related to tagged parameters, and that Takamoto et al. does not teach error checking of untagged, pre-merged sub-packets. Nonetheless, the Examiner then goes on to exposit on how notoriously well-known CRC (cyclic redundancy code) checks are, and based on this alone concludes that Takamoto et al. must therefore inherently disclose error checking of untagged, pre-merged sub-packets. See Office action at pg. 4.

The analysis proffered by the Examiner in the final Office action is, of course, legally incorrect, since it is a conclusion based solely on the possibility that the system disclosed in Takamoto et al. could perform such a function.

It is therefore submitted that Takamoto et al. fails to disclose, both explicitly and inherently, at least one element that is recited in independent Claim 16. As such, this citation cannot anticipate this claim. Moreover, because

independent Claim 16 is not anticipated, then dependent Claims 17 and 18 are also not anticipated.

II. CLAIMS 11, 12, and 14 ARE NOT ARE NOT ANTICIPATED BY WEISS

In the final Office action dated February 10, 2004, Claims 11, 12, and 14 were rejected under 35 U.S.C. § 102(a) as allegedly being anticipated by Weiss. As will be explained in more detail herein below, this rejection is not tenable because at least one element recited in independent Claim 11 is not found in Weiss.

A. Weiss

Weiss relates to a system and method for synchronizing encryption and decryption systems and discloses maintaining sequence numbers at both the transmission end and receiving end of an encrypted communication, to ensure error free transmission of the encrypted data. Specifically, when the receiver receives a block of encrypted data, it verifies proper block receipt by locally computing a block error correction code from the received data and comparing the computed error correction code against a copy of the error correction code received with the data (col. 6, ll. 23-39). If the computed error correction code and the error correction code copy do not match, the computed error correction code is temporarily stored in a CRC buffer, and the data block is re-transmitted to the receiver. If the re-computed and re-received error correction codes do not match, the codes are then compared to one or more previously stored, computed error correction codes (col. 12, ll. 17-61).

B. Analysis

Independent Claim 11 relates to a method of determining the transmitted order of a received packet relative to other received packets, and recites, *inter*

alia, setting a temporary ordering mask equal to a next ordering mask in a list of ordering masks.

Nowhere does Weiss disclose, either explicitly or inherently, at least the above-noted feature of independent Claim 11. Namely, Weiss fails to disclose setting a temporary ordering mask equal to a next ordering mask in a list of ordering masks, as recited in independent Claim 11. In the final Office action the Examiner alleges that Weiss discloses this feature because, as was noted above, Weiss teaches temporarily storing the computed error correction code is temporarily stored in a CRC buffer if the computed and received error correction codes do not match, and comparing the re-computed and re-received error correction codes to the previously stored error correction codes. See Office action at pg. 3.

However, Appellants submit that comparing re-computed error correction codes with computed error correction codes that have been temporarily stored is not anticipatory of at least the above-noted claim element. Specifically, Appellants submit that computing and comparing error correction codes is not anticipatory of setting a temporary ordering mask equal to a next ordering mask in a list of ordering masks. Indeed, the computed error correction codes disclosed in Weiss have nothing whatsoever in common with a mask, or data ordering, let along an ordering mask or a list of ordering masks.

Thus, since Weiss fails to disclose, either explicitly or inherently, at least one element that is recited in of independent Claim 11, this citation cannot anticipate this claim. Moreover, because independent Claim 11 is not anticipated, then dependent Claims 12 and 14 are also not anticipated.

III. CLAIMS 1-6, 19-24, 26, and 27 ARE NOT UNPATENTABLE UNDER 35 U.S.C. § 103 OVER TAKAMOTO ET AL. and WEISS

In the final Office action, Claims 1-6, 19-24, 26, and 27 were rejected under 35 U.S.C. § 103 as being unpatentable over Takamoto et al. and Weiss.

As will be explained in more detail herein below, this rejection is not tenable at least because one or more elements recited in independent Claims 1,16, and 23 are not found in any of the cited references.

A. Takaomoto et al. and Weiss

These patents and the associated disclosures were described above, and will therefore not be described further.

B. Analysis

It is well settled that the Examiner bears the initial burden of establishing a *prima facie* case of obviousness. In re Fine, 837 F.2d 1071, 1074 (Fed. Cir. 1988). The Examiner has the burden of setting forth a detailed evidentiary basis for the teaching, suggestion, or motivation to combine the cited references. As the Court of Appeals for the Federal Circuit recently reiterated, the factual inquiry of whether to combine references must be thorough and searching, and must be based upon objective evidence of record. In re Sang Su Lee, 277 F.3d 1338, 1343 (Fed. Cir. 2002). A claim cannot be found *prima facie* obvious unless all the elements of the claim are taught or suggested in the cited art. In re Royka, 490 F.2d 981, 180 U.S.P.Q. 580 (C.C.P.A. 1974); In re Wilson, 424 F.2d 1382, 1385 (C.C.P.A. 1970) ("All words in a claim must be considered in judging the patentability of that claim against the prior art.").

When relying on a reference to establish a prima facie case of obviousness, the reference must be considered as a whole, including those portions of the reference that would teach away from the claimed invention. W.L. Gore & Associates, Inc. v. Garlock, Inc. 721 F.2d 1540, 220 USPQ 303 (Fed. Cir. 1983), cert. denied, 469 U.S. 851 (1984). Moreover, the question in an obviousness analysis under § 103 is not whether the differences would have been obvious, but whether the claimed invention as a whole would have been obvious. Stratoflex, Inc. v. Aeroquip Corp. 713 F.2d 1530, 218 USPQ 871 (Fed. Cir. 1983) (emphasis added).

Appellants submit that the Examiner has not met his burden of establishing a *prima facie* case of obviousness, since the references do not teach or suggest all of the claim elements. Thus, as will now be shown, the claimed invention as whole is not obvious.

1. Rejection of Claims 1-6

Independent Claim 1 relates to a method of adding packet ordering information to a plurality of data packets that includes applying error codes to each of the plurality of data packets and recites, *inter alia*, masking each of the plurality of data packets to which the error detection codes have been applied, the masking being performed using a plurality of masks in a known order.

In the Office action the Examiner readily admits that Takamoto et al. fails to disclose at least the above-noted feature recited in independent Claim 1, but then goes on to erroneously allege that this feature is suggested in Weiss. However, as was clearly and readily pointed out above, Weiss simply does not disclose, or even remotely suggest masking data packets to which error detection codes have been applied using a plurality of masks in a known order. Hence, independent Claim 1 is non-obvious, which means that dependent Claims 2-6 are also non-obvious. In re Fine, supra.

2. Rejection of Claims 19-22

Claims 19-22 depend from independent Claim 16. As was noted previously, Takamoto et al. fails to disclose one or more features recited in independent Claim 16. Moreover, neither Weiss nor any other citation of record is understood to make up for the deficiencies of Takamoto et al., at least with respect to independent Claim 16. Because independent Claim 16 is neither anticipated nor obvious, dependent Claims 19-22 are also non-obvious. In re Fine, supra.

3. Rejection of Claims 23, 24, 26, and 27

Independent Claim 23 relates to a communications device that includes a packet formatter, a forward error device, and a mask store, and recites, *inter alia*, a masking device coupled to the mask store and the forward error device and responsive thereto to mask each of the formatted packets to which the error codes have been applied.

As noted in the previous analyses, Appellants submit that neither Takamoto et al. nor Weiss, either alone or in combination, disclose or evenly remotely suggest at least a masking device that masks formatted packets to which error codes have been applied. The Office action readily admits that Takamoto et al. does not disclose at least this feature, and then attempts to rely on Weiss to make up for this deficiency. See Office action at 8. Nonetheless, as was previously shown with respect to independent Claim 1, Weiss does not make up for this alleged soled deficiency of Takamoto et al.

In view of the above, Appellants submit that independent Claim 23 is not obvious. As a result, dependent Claims 24, 26, and 27 are also non-obvious.

IV. CLAIMS 7-10 AND 13 ARE NOT UNPATENTABLE UNDER 35 U.S.C. § 103 OVER WEISS AND GROSS ET AL.

The final Office action also rejected Claims 7-10 and 13 as being unpatentable under 35 U.S.C. § 103 over Weiss and Gross et al.

A. Weiss

This patent and the associated disclosure was described above, and will therefore not be described further.

B. Gross et al.

Gross et al. relates to media access control for handling transmission and reception of isochronous data and asynchronous data and, more particularly, to

preventing collisions during the transmission of isochronous data in carrier sensing multiple access transmission systems.

C. Analysis

Independent Claim 7 relates to a method of determining a packet order of a received packet and recites, *inter alia*, applying at least one ordering mask to the received packet in a known order from a list of ordering masks to find a current ordering mask that was previously used to mask the received packet.

As was previously noted, Weiss relates to a system and method for synchronizing encryption and decryption systems and discloses maintaining sequence numbers at both the transmission end and receiving end of an encrypted communication, to ensure error free transmission of the encrypted data. However, nowhere does Weiss disclose, or even remotely suggest, at least the above-noted feature of independent Claim 7. Namely, Weiss fails to disclose or suggest applying at least one ordering mask to the received packet in a known order from a list of ordering masks to find a current ordering mask that was previously used to mask the received packet. Rather, Weiss discloses maintaining sequence numbers using a local counter. The sequence numbers, however, are not in a known order from a list of sequence numbers.

Gross et al. does not make up for at least the above-noted deficiency of Weiss with respect to independent Claim 7. Since independent Claim 7 is non-obvious, Claims 8-10 are also non-obvious.

IV. CLAIM 15 IS NOT UNPATENTABLE UNDER 35 U.S.C. § 103 OVER WEISS AND LARSSON ET AL.

The final Office action further rejected Claim 15 as being unpatentable under 35 U.S.C. § 103 over Weiss and Larsson et al.

A. Weiss

This patent and the associated disclosure was described above, and will therefore not be described further.

B. Larsson et al.

Larsson et al. relates to the transportation of a priori information, such as sender and receiver information, in a multiple base station or multiple access, wireless asynchronous transfer method (ATM) system.

C. Analysis

Claim 15 depends from independent Claim 11. It was shown above that Weiss fails to disclose at least one element of independent Claim 11. Moreover, Larsson et al. is not understood to make up for at least this deficiency of Weiss. As such, Claim 15 cannot be rendered obvious by the combination of these citations.

V. CLAIM 25 IS NOT UNPATENTABLE UNDER 35 U.S.C. § 103 OVER TAKAMOTO ET AL., WEISS and LEOPOLD

The final Office action additionally rejected Claim 25 as being unpatentable under 35 U.S.C. § 103 over Takamoto et al., Weiss and Leopold

A. Takamoto et al. and Weiss

These patents and the associated disclosures were described above, and will therefore not be described further.

B. Leopold

Leopold relates to a method and apparatus for encrypting voice data.

C. Analysis

C. Analysis

Claim 25 depends from independent Claim 23. It was shown above that neither Takamoto et al. nor Weiss, either alone or in combination, disclose at least one element of independent Claim 23. Moreover, Leopold is not understood to make up for deficiencies of Takamoto et al. or Weiss. As such, Claim 25 cannot be rendered obvious by the combination of Takamoto et al., Weiss, and Leopold.

X. Conclusion

In view of the foregoing, Appellant submits that the final rejection of Claims 1-27 is improper and should not be sustained. Therefore, a reversal of the rejections in the final Office action dated February 10, 2004 is respectfully requested.

Respectfully submitted,

Dated 5/12/04

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XI. APPENDIX

Claims on Appeal

1. A method of adding packet ordering information to a plurality of data packets comprising:

applying error detection codes to each of the plurality of data packets; and

masking each of the plurality of data packets to which the error detection codes have been applied, the masking being performed using a plurality of ordering masks in a known order.

2. The method of claim 1 wherein masking comprises exclusive or'ing each of the plurality of data packets with a corresponding one of the plurality of ordering masks.

3. The method of claim 1 wherein each of the plurality of data packets to which the error detection codes have been applied is masked with one of the plurality of ordering masks, the plurality of ordering masks and the known order being known by a receiver such that the receiver can discern a relative packet order using the plurality of ordering masks.

4. The method of claim 1 wherein the plurality of ordering masks comprises cryptographic keys.

5. The method of claim 1 wherein the plurality of ordering masks are masks other than cryptographic keys, the method further comprising prior to applying error detection, encrypting each of the plurality of data packets.

6. The method of claim 1 wherein:

the plurality of data packets are to be transmitted in a network having a maximum latency variability; and

the plurality of ordering masks includes a sufficient number of ordering masks for a receiver to identify a correct order of two packets received out of order and received a distance apart in time less than or equal to the maximum latency variability.

7. A method of determining a packet order of a received packet comprising:

applying at least one ordering mask to the received packet in a known order from a list of ordering masks to find a current ordering mask that was previously used to mask the received packet; and

when at least one older ordering mask exists in the list of ordering masks, the at least one older ordering mask occurring earlier in the known order than the current ordering mask, removing the at least one older ordering mask from the list of ordering masks.

8. The method of claim 7 wherein applying comprises:

applying a first ordering mask to the received packet to produce a first unmasked received packet;

checking the first unmasked received packet for errors; and

when errors in the first unmasked received packet are below a threshold, setting the current ordering mask to the first ordering mask.

9. The method of claim 8 wherein the received packet has had forward correction and masking applied thereto prior to transmission, and wherein checking comprises applying forward error correction.

10. The method of claim 7 further comprising:

successively applying the ordering masks that remain on the list of ordering masks to the received packet; and

when after applying all of the list of ordering masks to the received packet, the current ordering mask is not found, discarding the received packet.

11. A method of determining the transmitted order of a received packet relative to other received packets comprising:

setting a temporary ordering mask equal to a next ordering mask in a list of ordering masks;

applying the temporary ordering mask to the received packet to produce an unmasked received packet;

checking the unmasked received packet for errors;

repeating the previous actions until no errors are found when errors are found; and

setting a current ordering mask equal to the temporary ordering mask.

12. The method of claim 11 wherein the list of ordering masks is maintained in an order of packet transmission, and the current ordering mask defines a relative transmission order of the received packet.

13. The method of claim 12 further comprising:

if the received packet is older than a previously received packet, discarding the received packet.

14. The method of claim 12 further comprising:

if the received packet is not older than a previously received packet, marking the current ordering mask as a most recently used mask.

15. The method of claim 12 wherein the list of ordering masks comprises cryptographic keys.

16. A communications device comprising:

a packet receiver;

a mask store;

an unmasking device coupled to the mask store and the packet receiver, the unmasking device being configured to unmask received packets; and

an error detection device coupled to the unmasking device, the error detection device being configured to detect errors in unmasked received packets.

17. The communications device of claim 16 further comprising a controller coupled to the mask store and the error detection device, the controller being configured to evaluate error information received from the error detection device, and further configured to command the mask store to provide masks to the unmasking device.

18. The communications device of claim 17 wherein the mask store includes a plurality of masks, the plurality of masks representing an order of transmission of a plurality of packets.

19. The communications device of claim 16 wherein the mask store is a key generator capable of generating keys to decrypt encrypted packets.

20. The communications device of claim 16 wherein the mask store includes a plurality of masks, and the mask store is configured to operate as a circular buffer such that the plurality of masks is used more than once.

21. The communications device of claim 20 wherein the mask store is configured to maintain a most recent mask pointer that points to a most recently used mask.

22. The communications device of claim 16 further comprising a decryptor coupled to the unmasking device, the decryptor being configured to decrypt unmasked packets using keys received from a key generator.

23. A communications device comprising:

a packet formatter adapted to receive data packets and configured to supply formatted packets;

a forward error device coupled to receive the formatted packets from the packet formatter and configured to apply error codes to the formatted packets;

a mask store; and

a masking device coupled to the mask store and the forward error device and responsive thereto to mask each of the formatted packets to which the error codes have been applied.

24. The communications device of claim 23 wherein the packet formatter is a data packet formatter.

25. The communications device of claim 23 wherein the packet formatter comprises a vocoder.

26. The communications device of claim 23 wherein the masking device comprises an encryptor, and the mask store comprises a key generator.

27. The communications device of claim 23 further comprising an encryptor coupled between the packet formatter and the forward error device, wherein the encryptor is configured to receive the formatted packets from the packet formatter, encrypt the formatted packets, and send encrypted formatted packets to the forward error device.